REMARKS

The above Amendments and these Remarks are in reply to the Office Action mailed May 27, 2004. Claims 1, 2, 4-9, 11-15, 17-34 and 36-41 were pending in the Application prior to the outstanding Office Action. Claims 1-2, 4-8, 11-15, 18-30, 32-34 and 36-41 are currently being amended, and claim 17 is currently being canceled. Claims 1, 2, 4-9, 11-15, 18-34 and 36-41 remain for the Examiner's consideration.

In the Office Action mailed May 27, 2004, claims 1, 2, 4-9, 11-15, 17-34 and 36-41 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Lee* (U.S. Patent No. 4,789,801) or *Sakakibara et al.* (U.S. Patent No. 4,643,745). For at least the following reasons, Applicants respectfully request that these rejections be reconsidered and withdrawn.

I. Discussion of Claim 1

Claim 1, as amended, is reproduced below for the convenience of the Examiner.

1. An ion generator comprising:

an ion emitter electrode;

a collector electrode; and

a voltage generator to provide a voltage potential difference between the ion emitter ~~first~~ electrode and the collector electrode in order, when energized, to create a flow of air in a downstream direction from the ion emitter electrode to the collector electrode;

wherein there is no further electrode located between the ion emitting electrode and the collector electrode; and

wherein the ion emitter electrode is one of (1) slack, (2) curved, and (3) coiled and spans a distance, and wherein the ion emitter electrode has a length that is at least fifteen percent greater than said distance.

Claim 1 as amended replaces the term "first electrode" with "ion emitter electrode" and the term "second electrode" with "collector electrode" to better define the invention. Further, claim 1 as amended makes it clear that there are no further electrode between the ion emitter electrode and the collector electrode.

As stated in paragraph [0133] on page 38 of the specification, "[i]n general, the quantity of negative ions generated and emitted by the first (i.e., ion emitter) electrode is proportional to the surface area of the first electrode." As further explained in paragraph [0133], for a given electrode height, the length of a curved or slack wire emitter electrode is greater (e.g., 15-30% greater) than a straight electrode of the same height (i.e., spanning the same distance). In discussing FIG. 13A in paragraph [0133], the specification states that "[t]he greater total length of the [ion emitter] electrode 252 translates to a larger surface area than the [straight] wire-shaped electrodes 232. Thus, the electrodes 252 will generate and emit more ions than the [straight] electrode 232. Ions emitted by the ion emitter electrode array attach to the particulate matter within the airflow. The charged particulate matter is attracted to, and collected by, the oppositely charged second collector plates 242. Since the ion emitter electrodes 252 generate and emit more ions than the previously described [straight] electrodes 232, more particulate matter will be removed from the air."

Paragraph [0135] on page 39 of the specification explains that a coiled ion emitter electrode is also longer than a straight (i.e., taught) electrode, possibly even multiple times longer. In discussing FIG. 13C, in paragraph [0135], it is explained that the ion emitter electrodes 256 "have a larger surface area than the [straight] electrodes 232, and generate and emit more ions than the [straight] first electrodes 232." For the same reasons just explained

above, since the coiled electrodes generate and emit more ions than the straight (i.e., taught) electrodes, more particulate matter should be removed from the air.

Applicants respectfully disagree with the Examiner's broad assertion that the use of curved, slack or coiled electrodes is merely an obvious matter of design choice. As shown above, the specification explains that an ion emitter electrode that is slack, has curves, or is coiled is longer than an straight (i.e., taught) electrode of the same height, thereby emitting more ions, and enabling more particulate matter to be removed from the air.

I.A Summary of the Rejection of Claim 1

It is again admitted in the Office Action that the "first electrodes" in Lee, as well as in Sakakibara, are not slack, curved, or coiled. However, in the Examiner's "Response to Arguments" on page 5, section 6 of the Office Action, the following is stated:

> However, it has been within the skill in the art that the amount of ions emitted by an electrode is dependent upon different parameters, such as the voltage applied to the electrode and the disposition of the electrode with respect to other electrodes, shape and length of the electrode. As illustrated by Sakakibara, Fig. 5, a thinner and longer electrode would enhance ion emission (see col. 5, ln. 44-47), and an increase in the voltage applied to the electrode would also enhance ion emission (see col. 4, ln. 62-64). Furthermore, as pointed out in paragraph 4 above, Lee teaches the sizes of dimensions of the electrodes could be adapted to the characteristics of a particular exciting circuit and to the practical considerations of a particular application. As further illustrated by Lee, the thinner the electrode (higher electrode scale ratio) the more ion emission (see col. 4, ln. 44-52).

I.B A Prima Facie Case of Obviousness has not been Established

Applicants respectfully assert that a *prima facie* case of obviousness has not been established. As explained in MPEP 2143.03, "[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art."

The applied prior art references do not teach an ion emitter electrode that is slack, curved or coiled and spans a distance, "wherein said ion emitter electrode has a length that is at least fifteen percent greater than said distance." The Examiner admits this in the Office Action.

Nevertheless, without providing any actual support or rationale, the Examiner has asserted that "it would have been obvious to one of ordinary skill in the art, at the time the invention was made, that specific configurations of the electrodes would have been an obvious matter of design choice" and that "with respect to the specific size of electrodes, it has been within the skill in the art that specific sizes are relative dimensions that would have been merely determined by routine experimentation in order to bring forth maximal benefits attendant therewith."

Applicants respectfully disagree that the claimed configuration of the ion emitter electrode (i.e., that the ion emitter is slack, curved or coiled such that the ion emitter electrode has a length that is at least fifteen percent greater than the distance that the ion emitter electrode spans) would have been an obvious matter of design choice. The Examiner has cited no case law or MPEP section that states that the Examiner's general assertion is sufficient to establish a prima facie case of obviousness. Further, the Examiner has not pointed to any relevant suggestion or motivation in the prior art to produce the claimed invention.

As pointed out by the Federal Circuit in *In re Fritch*, "The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious

unless the prior art suggested the desirability of the modification." 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992). If the Examiner is to maintain this rejection, Applicants respectfully request that the Examiner point out where the prior art suggests providing a slack, curved or coiled ion emitter electrode such that the ion emitter electrode has a length that is at least fifteen percent greater than the distance that the ion emitter electrode spans.

I.C Discussion of Sakakibara Patent

In the Office Action, column 5, lines 44-47 and column 4, lines 62-64 of Sakakibara were relied upon for allegedly obviating the feature of claim 1 relating an ion emitting electrode being slack, curved or coiled such that the ion emitting electrode has a length that is at least fifteen percent greater than a distance that the electrode spans.

Column 5, lines 44-47 of Sakakibara states "In the above embodiment, needle electrodes were used for the discharge electrodes. Electrically conductive wires 111 can also be used to increase the wind speed by the accelerating effect with less ozone generation." Accordingly, this portion of Sakakibara merely states that wire electrode can be used in place of needle electrodes in order to increase wind speed and reduce ozone generation. Applicants do not see how this obviates Applicants' claimed invention. This portion of Sakakibara clearly does **not** disclose, and clearly does **not** provide any motivation for, making the ion emitting electrode slack, curved or coiled such that the ion emitting electrode has a length that is at least fifteen percent greater than a distance that the electrode spans.

Column 4, lines 62-64 of Sakakibara explains that "an increase in the speed of the ionic wind corresponds to an increase in the voltage applied to the needle electrodes." Applicants do not see how this obviates Applicants' claimed invention. Applicants do not see how this obviates

Applicants' claimed invention. This portion of Sakakibara clearly does **not** disclose, and clearly does **not** provide any motivation for, making an ion emitter electrode slack, curved or coiled such that the electrode has a length that is at least fifteen percent greater than a distance that the electrode spans.

I.D Discussion of Lee Patent

In the Office Action, column 4, lines 44-52 of Lee were relied upon for allegedly obviating the feature of claim 1 relating an ion emitting electrode being slack, curved or coiled such that the ion emitting electrode has a length that is at least fifteen percent greater than a distance that the electrode spans.

Column 4, lines 44-52 of Lee explains that each electrode is approximately 12 inches long, and that "these dimensions are merely illustrative, and will be adapted to the characteristics of a particular exciting circuit, and to the practical considerations of a particular application." This portion of Lee merely says that the dimensions of electrodes may be changed to meet particular conditions or applications. In other words, with Lee, if a larger electro-kinetic apparatus were needed, the entire apparatus would be made larger, resulting in longer electrodes that are proportional to the lengthened apparatus. However, this portion of Lee does not teach or suggest that an ion emitter electrode can be made longer (resulting in increased ion output) without increasing the entire length of the electro-kinetic apparatus. In contrast, embodiments of the present invention provide for increased ionic output by lengthening an ion emitter electrode by at least fifteen percent (by making it slack, curved or coiled) without requiring that the distance that the ion emitter electrode spans be increased (i.e., without requiring the length of the apparatus be increased).

1.E Discussion of newly submitted Torok Patent

Applicants have submitted U.S. Patent No. 5,812,711 to Torok et al. (hereafter Torok) in the IDS filed herewith. FIGS. 4 and 5 Torok show a corona discharge air transporting arrangement that includes a corona electrode (K), and a target electrode (M) that is located downstream from the corona electrode (K). FIGS. 4 and 5 of Torok also show a screen electrode (S) that is located upstream from the corona electrode (K). In other words, the corona electrode (K) is located between the screen electrode (S) and the target electrode (M).

Column 12, lines 38-40 of Torok says "When the corona electrode K comprises a thin straight wire, the screen electrode may, for example, have the form of a rod or a helically formed wire." Column 12, lines 48-54 or Torok says "In principal, the screen electrode S is given a geometric configuration and position relative to the corona electrode K such that the screen electrode S forms an equipotential barrier or surface which is impermeable to ions emanating from the corona electrode K."

Accordingly, while Torok suggests that a screen electrode can be a helically formed wire, there is no teaching or suggestion in Torok the corona discharge electrode (which is analogous to the "ion emitter electrode" of claim 1) can be a helically formed wire.

As explained above, the purpose of the screen electrode of Torok is to form a "barrier or surface which is impermeable to ions emanating from the corona electrode." In contrast, the purpose of the corona discharge electrode of Torok is to emit ions (as is the purpose of the ion emittier electrode of the claim 1). Thus, even though Torok suggests that the screen electrode can be helical, one or ordinary skill in the art reading Torok would not be motivated to make the corona discharge electrode (K) of Torok slack, curve or coiled such that the electrode has a

length that is at least 15% greater than the distance that it spans. Rather, if one of ordinary skill in the art would to read Torok, they would think that a helical electrode could only be used for creating a barrier or surface ***which is impermeable to ions*** emanating from the corona electrode. In other words, one of ordinary skill in the art reading Torok would certainly not think that it would be beneficial to use a slack, curve or coiled electrode as an ion emitter electrode.

For at least the above discussed reasons, Applicants respectfully assert that claim 1 as amended is also patentable over Torok.

II. Remaining Claims

Claim 2, as amended, states that "said ion emitter electrode is slack and spans a distance, and wherein said ion emitter electrode has a length that is at least fifteen percent greater than said distance." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 2, as well as its dependent claim 4, are patentable.

Claim 5, as amended, states that "wherein said ion emitter electrode is a coil and spans a distance, and wherein said ion emitter electrode has a length that is at least fifteen percent greater than said distance." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 5, as well as its dependent claims 6 and 7, are patentable.

Claim 8, as amended, states that "wherein said ion emitter electrode has a plurality of curves and spans a distance, and wherein said ion emitter electrode has a length that is at least fifteen percent greater than said distance." For reasons similar to those discussed above with

reference to claim 1, Applicants respectfully assert that claim 8, as well as its dependent claim 9, are patentable.

Claim 11, as amended, includes "a means for emitting ions having a length that is at least fifteen percent greater than a distance that the means spans." For reasons similar to those explained in detail above, there are significant advantages using a significantly lengthened means for emitting ions, as compared to a shorter means for emitting ions. These include emitting more ions, and enabling more particulate matter to be removed from the air. For at least these reasons, Applicants respectfully assert that claim 11 is patentable.

Claim 12, as amended, includes an "ion emitter electrode being slack so that its length is at least fifteen percent greater than said distance that said ion emitter electrode spans, in order to enhance emissivity." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 12 is patentable.

Claim 13 states that "said ion emitter electrode including a plurality of curves that cause its length to be at least fifteen percent greater than said distance in order to enhance emissivity." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 13 is patentable.

Claim 14 states that "said ion emitter electrode being coiled so that its length is at least fifteen percent greater than the distance that said ion emitter electrode spans, in order to enhance

emissivity." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 14 is patentable.

Claim 15 states includes the step of "providing an ion emitter electrode that is sufficiently slack, curved or coiled such that its length is at least fifteen percent greater than a distance that said ion emitter electrode spans." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 15, as well as its dependent claims 16 and 19, are patentable.

Claim 20 states that "said ion emitter ~~first~~ electrode spans a distance, and wherein said ion emitter ~~first~~ electrode is sufficiently slack, curved or coiled such that its length is at least fifteen percent greater than said distance." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 20 is patentable.

Claim 21 includes "a means for emitting ions having a length that is at least fifteen percent greater than a distance that the means spans". For reasons similar to those discussed above with reference to claims 1 and 11, Applicants respectfully assert that claim 21, as well as its dependent claims 37-39, are patentable.

Claim 29 includes "an ion emitter electrode that spans a distance within said housing, said ion emitter electrode created from a wire-shaped element, and formed into a coil-shape such that a length of said electrode is at least fifteen percent greater than said distance." For reasons

similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 29, as well as its dependent claims 30-33, are patentable.

Claim 34 includes a "an ion emitter electrode that spans a distance within said housing, said ion emitter electrode created from a wire shaped element, and formed into a curved configuration such that a length of said ion emitter electrode is at least fifteen percent greater than said distance." For reasons similar to those discussed above with reference to claim 1, Applicants respectfully assert that claim 34, as well as its dependent claims 36 and 40, are patentable.

Claim 41 states that "said ion emitter electrode has a plurality of curves that cause a length of said ion emitter electrode to be longer than said distance, said plurality of curves being in a same plane, said plane being parallel to said substantially flat surfaces of collector electrodes". None of the prior art references patents discussed above teach or suggest an ion emitter electrode including a plurality of curves being in a same plane that is parallel to the substantially flat surfaces of a pair of collector electrodes.

In light of the above, it is respectfully requested that all outstanding rejections be reconsidered and withdrawn. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response, including any fee for extension of time, which may be required.

Respectfully submitted,

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